

NSQF QUALIFICATION FILE

Version 6: Draft of 08 March 2016

NSDA Reference

To be added by NSDA

Welder

CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE

Directorate General of Training (DGT)
Government of India, Ministry of Skill Development and Entrepreneurship,
Shram Shakti Bhavan, Rafi Marg
New Delhi-110001

Name and address of submitting body:

Directorate General of Training (DGT)
Government of India, Ministry of Skill Development and Entrepreneurship,
Shram Shakti Bhavan, Rafi Marg
New Delhi-110001

Name and contact details of individual dealing with the submission

Name: Shri Deepankar Mallick

Position in the organisation: Deputy Director General (T)

Address if different from above:

Tel number(s): 011-23710485

E-mail address: deepankar.mallick60@nic.in

List of documents submitted in support of the Qualifications File

1. Competency-based curriculum (Annexure 1)
2. Advertisements of different organisations for posts relevant to NTC in the trade
3. Placement figures of few ITIs

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Welder

SUMMARY

Qualification Title	'Welder'		
Qualification Code	N/A		
Nature and purpose of the qualification	National Trade Certificate; to train the 10th class pass students in 'Welder' trade and thus changing a non-worker to worker		
Body/bodies which will award the qualification	National Council for Vocational Training (NCVT)		
Body which will accredit providers to offer courses leading to the qualification	National Council for Vocational Training (NCVT) affiliates the ITIs on the basis of accreditation by Quality Council of India (QCI).		
Body/bodies which will carry out assessment of learners	National Council for Vocational Training (NCVT)		
Occupation(s) to which the qualification gives access	Gas welding (includes gas cutting), Arc welding, TIG welding, MIG/MAG welding etc		
Licensing requirements	N/A		
Level of the qualification in the NSQF	Level 4		
Anticipated volume of training/learning required to complete the qualification	S. No.	Course Element	Notional Training Hours
	1	Professional Skill (Trade Practical)	1075
	2	Professional Knowledge (Trade Theory)	258
	3	Workshop Calculation & Science	86
	4	Engineering Drawing	129
	5	Employability Skills	110
	6	Library & Extracurricular activities	62
	7	Project work	80
	8	Revision & Examination	280
	Total		2080*
*The major change is the addition of revision component of approximately 200 hours, however there is slight reduction in components like Professional Skills, Library & Extracurricular activities and Project Work. Hence there is overall increase of 100 notional hours.			
Entry requirements and/or recommendations	Passed 10th Class Examination		
Progression from the qualification	<ul style="list-style-type: none"> • Can join as semi-skilled worker in the industry and can become supervisor after doing part-time diploma in relevant branch of Engineering • Can join Apprenticeship programme in different types of industries leading to National Apprenticeship certificate (NAC) after which they will be employed in industry as skilled worker 		

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	and can become supervisor after doing part-time diploma in relevant branch of Engineering		
	<ul style="list-style-type: none"> Can join Crafts Instructor Training Scheme (CITS) in the trade after which they will be employed in ITI/ Vocational Training Institute as instructor. 		
Planned arrangements for the Recognition of Prior learning (RPL)	<ol style="list-style-type: none"> At present the students who have passed 10th class with minimum 3 years' experience in relevant field can appear for NCVT theory and practical semester examination directly. The students who have passed SCVT examination in 'Welder' trade can also appear for the NCVT Examination in the relevant semester and Trade directly. 		
International comparability where known	<ol style="list-style-type: none"> Existence of any official document suggesting the comparability of the qualification with the qualifications in other countries is not known. However, ITI passed out trainees are getting employment in many Gulf countries, European countries, Australia, New Zealand, Singapore etc. 		
Date of planned review of the qualification.	January 2020		
Formal structure of the qualification			
Title of component and identification code.	Mandatory/ Optional	Estimated size (learning hours)	Level
Semester-I			
(i) Install and setup operating system and Set the gas welding plant and join MS sheet in different position. [Different position: - 1F, 2F, 3F, 1G, 2G, 3G.]	Mandatory	65	4
(ii) Set the SMAW machine and perform different type of joints on MS in different position observing standard procedure. [different types of joints- Fillet (T-joint, lap & Corner), Butt (Square & V); different position - 1F, 2F, 3F,4F, 1G, 2G, 3G, 4G]	Mandatory	280	4
(iii) Set the oxy- acetylene cutting plant and perform different cutting operations on MS plate. [Different cutting operation – Straight, Bevel, circular]	Mandatory	35	4
(iv) Perform welding in different types of MS pipe joints by Gas welding (OAW). [Different types of MS pipe joints – Butt, Elbow, T- joint, angle (45°) joint, flange joint]	Mandatory	110	4
(v) Set the SMAW machine and perform welding in different types of MS pipe joints by SMAW. [Different types of MS pipe joints – Butt, Elbow, T-joint, angle (45°) joint,	Mandatory	80	4

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	flange joint]			
(vi)	Choose appropriate welding process and perform joining of different types of metals and check its correctness. [appropriate welding process – OAW, SMAW; Different metal – SS, CI, Brass, Aluminium]	Mandatory	80	5
(vii)	Demonstrate arc gauging operation to rectify the weld joints.	Mandatory	20	4
Semester – II				
(viii)	Test welded joints by different methods of testing. [different methods of testing- Dye penetration test, Magnetic particle test, Nick break test, Free band test, Fillet fracture test]	Mandatory	35	4
(ix)	Set GMAW machine and perform welding in different types of joints on MS sheet/plate by GMAW in various positions by dip mode of metal transfer. [different types of joints- Fillet (T-joint, lap, Corner), Butt (Square & V); various positions- 1F, 2F, 3F,4F, 1G, 2G, 3G]	Mandatory	310	4
(x)	Set the GTAW machine and perform welding by GTAW in different types of joints on different metals in different position and check correctness of the weld. [different types of joints- Fillet (T-joint, lap, Corner), Butt (Square & V) ; different metals- Aluminium, Stainless Steel; different position- 1F & 1G]	Mandatory	130	4
(xi)	Perform Aluminium & MS pipe joint by GTAW in flat position.	Mandatory	45	3
(xii)	Set the Plasma Arc cutting machine and cut ferrous & non-ferrous metals.	Mandatory	20	4
(xiii)	Set the resistance spot welding machine and join MS & SS sheet.	Mandatory	35	4
(xiv)	Perform joining of different similar and dissimilar metals by brazing operation as per standard procedure. [different similar and dissimilar metals- Copper, MS, SS]	Mandatory	60	3
(xv)	Repair Cast Iron machine parts by selecting appropriate welding process. [Appropriate welding process- OAW, SMAW]	Mandatory	20	4
(xvi)	Hard facing of alloy steel components / MS rod by using hard facing electrode.	Mandatory	20	4
Generic Learning Outcomes				
(xvii)	Recognize & comply safe working practices,	Mandatory	35	4

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(xviii)	environment regulation and housekeeping. Understand and explain different mathematical calculation & science in the field of study including basic electrical. [Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, elasticity]	Mandatory	86	5
(xix)	Interpret specifications, different engineering drawing and apply for different application in the field of work. [Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, Different Projections, Assembly drawing, Sectional views, Estimation of material]	Mandatory	129	5
(xx)	Select and measure dimension of components and record data.	Mandatory	15	4
(xxi)	Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	Mandatory	13	5
(xxii)	Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	Mandatory	6	5
(xxiii)	Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	Mandatory	6	5
(xxiv)	Plan and execute the work related to the occupation.	Mandatory	20	5

Please attach any document giving further detail about the structure of the qualification – eg a Curriculum Document or a Qualification Pack.

Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

SECTION 1
ASSESSMENT

Body/Bodies which will carry out assessment:

National Council for Vocational Training (NCVT)

How will RPL assessment be managed and who will carry it out?

1. At present the students who have passed 10th class with minimum 3 years' experience in relevant field can appear for NCVT theory and practical semester examination directly.
2. The students who have passed SCVT examination in 'Welder' trade can also appear for the NCVT Examination in the relevant semester and Trade directly. State Directorates advertise in newspapers for informing the prospective candidates and NCVT will carry out the assessment.

Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, reliable and fair and show that these are in line with the requirements of the NSQF.

(1) Assessment process:

The assessment for the semester-based qualification is carried out by conducting formative assessments, and end-of-semester examinations. The internal assessments for theory subjects and practical are conducted by the concerned instructors for evaluating the knowledge and skill acquired by trainees and the behavioural transformation of the trainees. This internal assessment is primarily carried out by collecting evidence of competence gained by the trainees by evaluating them at work based on assessment criteria, asking questions and initiating formative discussions to assess understanding and by evaluating records and reports, and sessional marks are awarded to them. Theory and practical examinations are conducted in Trade theory, Workshop Calculation & Science, Engineering Drawing and Employability Skills. The question papers for the theory Examinations contain objective type questions. Trade practical examinations are conducted by the respective State Governments. However, the question papers for the Trade practical are prepared by NCVT.

The marking pattern and distribution of marks for the qualification are as under:

Marking Pattern		
Sl. No.	Subject for the trade test	Maximum marks for the each subject
a)	Practical	300
b)	Trade Theory	200
c)	Employability Skills	Objective type Written test of 200 marks (Trade Theory 150 marks & Employability Skills 50 marks)
d)	Work shop Calculation and Science.	100
e)	Engineering Drawing	Objective Type Written test of 100 marks (Engineering Drawing 50 marks & Work shop Calculation and Science 50 marks)

f)	Internal assessment	100
TOTAL:		700

(2) Minimum pass marks:

40% for each Theory Examination and 25% for each part/section of the Examination separately, and 60% marks for each Trade practical Examination.

(3) Testing and certifications for the course:

- OMR sheet based question paper.
- A panel of expert paper setters, who are graduates in the concerned field with minimum 5-7 years' experience, is prepared for setting question papers for the Trade. The panel is vetted by the Member Secretary, NCVT.
- Paper setters are appointed from the panel after the approval of the competent authority for setting the question paper.
- The question papers are then moderated by the Board of Moderation to see if the paper is set as per the requirement and syllabus.
- Printed question papers, packed in sealed covers, are despatched to Banks/Police Stations for keeping in safe custody.
- The question papers are handed over to the Chairman/Principal of the Testing Centre two hours before the commencement of the Examination.
- An Examination Board consisting of representatives of industry/Employer/State Government are set up to supervise and monitor the conduct of Examinations at every Centre.
- Theory and practical Examinations are carried out with invigilators/examiners with the overall supervision of the Examination Board.
- Examiners called for evaluation of practical should have minimum technical qualification of a Diploma in the respective engineering field. However, when diploma holders not available, the qualification is suitably relaxed.
- Examiners for practical Examinations are appointed preferably from Polytechnics/ Engineering colleges/ Industry of repute/ Government Departments or from amongst retired qualified personnel possessing requisite qualifications and sufficient experience in the trade/discipline.
- Each State Directorate prepares a panel of Examiners according to the norms as mentioned above and the Examiners are appointed from the panel.
- Flying squads from State Governments as well as the Central Government are constituted to check malpractices during the conduct of Examinations.
- OMR based answer sheets are evaluated by the third party evaluator only. Third party evaluator is selected for three years by open bidding process.
- Evaluation of every practical examination is carried out by the concerned examiner (from industry/ polytechnics) with the overall supervision of the Examination Board in a free and fair manner as per the assessment criteria.
- Till 2014, the marks were compiled by the State Governments as per NCVT guidelines and the results were declared by the State Governments. At present, the marks are compiled by NCVT on its portal www.ncvtmis.gov.in and the results are declared by the State Governments.
- The successful trainees are awarded National Trade Certificates.

Overall assessment strategy:

Assessment of the qualification evaluates trainees to show that they can integrate knowledge, skills and values for carrying out relevant tasks as per the defined assessable outcomes and assessment

criteria. The trainees may choose the preferred language for assessment. The underlying principle of assessment is fairness and transparency. While assessing the trainee, assessor is directed to assess as per the defined assessment criteria against the assessable outcomes. The evidence of the competence acquired by the trainees can be obtained by conducting theory and practical examinations, observing the trainees at work, asking questions and initiating formative discussions to assess understanding and evaluating records and reports. The ultimate objective of the assessment is to assess the candidates as per the defined assessment criteria for the assessable/ learning outcomes.

Specific Arrangements for assessment:

- Assessment is outcome-based.
- There are formative and summative assessments in Theory and Practical.
- Assessment is carried out in Trade theory, Trade Practical, Workshop Calculation and Science, Engineering Drawing and Employability Skills.
- While Trade Theory and Trade Practical are used for assessing Trade-related jobs, Workshop Calculation and Science is used to test trainee's numerical skills, Drawing is used to test the ability of the trainee to draw and read sketches and Employability skills is used to test the communication and language skills of the trainee.
- In addition to demonstration of theory and practical knowledge, trainees get a chance to present total personality.

Quality assurance activities:

- Question papers are set by external paper setters
- Evaluation of Theory Examinations is done by third-party agency. Third party evaluator is selected for three years by open bidding process.
- Trade Practical is examined by External Examiner (as explained above).

Please attach any documents giving further information about assessment and/or RPL.

Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

ASSESSMENT EVIDENCE

Complete a grid for each component as listed in "Formal structure of the the qualification" in the Summary.

NOTE: this grid can be replaced by any part of the qualification documentation which shows the same information – ie Learning Outcomes to be assessed, assessment criteria and the means of assessment.

Title of Component: Welder

Assessable Outcomes and Assessment Criteria

GENERIC LEARNING/ ASSESSABLE OUTCOME	
LEARNING/ ASSESSABLE OUTCOMES	ASSESSMENT CRITERIA
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1. 1. Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1. 2. Recognize and report all unsafe situations according to site policy.
	1. 3. Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1. 4. Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1. 5. Identify and observe site policies and procedures in regard to illness or accident.
	1. 6. Identify safety alarms accurately.
	1. 7. Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1. 8. Identify and observe site evacuation procedures according to site policy.
	1. 9. Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1. 10. Identify basic first aid and use them under different circumstances.
	1. 11. Identify different fire extinguisher and use the same as per requirement.
	1. 12. Identify environmental pollution & contribute to avoidance of same.
	1. 13. Take opportunities to use energy and materials in an environmentally friendly manner
	1. 14. Avoid waste and dispose waste as per procedure
	1. 15. Recognize different components of 5S and apply the same in the working environment.
2. Understand and explain different mathematical calculation & science in the field of study including basic	2.1 Explain concept of basic science related to the field such as Material science, Mass, weight, density, heat & temperature, heat treatment.
	2.2 Measure dimensions as per drawing

electrical. <i>[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry, Mensuration, Trigonometry, Heat & Temperature, elasticity]</i>	2.3	Use scale/ tapes to measure for fitting to specification.
	2.4	Comply given tolerance.
	2.5	Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6	Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.7	Explain basic electricity, insulation & earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. <i>[Different engineering drawing- Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, Different Projections, Assembly drawing, Sectional views, Estimation of material]</i>	3. 1.	Read & interpret the information on drawings and apply in executing practical work.
	3. 2.	Read & analyse the specification to ascertain the material requirement, tools, and assembly /maintenance parameters.
	3. 3.	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Select and measure dimension of components and record data.	4.1	Select appropriate measuring scale/tape/gauges.
	4.2	Measure dimension of the components/assembly & compare with given drawing/measurement.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	5.1	Explain the concept of productivity and quality tools and apply during execution of job.
	5.2	Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3	Knows benefits guaranteed under various acts
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	6.1	Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.
	6.2	Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in	7. 1.	Explain personnel finance and entrepreneurship.
	7. 2.	Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for

day to day work for personal & societal growth.	financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
	7. 3. Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and execute the work related to the occupation.	8. 1. Use documents, drawings and recognize hazards in the work site.
	8. 2. Plan workplace/ assembly location with due consideration to operational stipulation
	8. 3. Communicate effectively with others and plan project tasks
	8. 4. Execute the task effectively.

SPECIFIC OUTCOME

Semester-I

LEARNING/ ASSESSABLE OUTCOMES	ASSESSMENT CRITERIA
9. Set the gas welding plant and join MS sheet in different position. <i>[Different position: - 1F, 2F, 3F, 1G, 2G, 3G.]</i>	9. 1. Plan and select the nozzle size, working pressure, type of flame, filler rod as per requirement.
	9. 2. Prepare, set and tack the pieces as per drawing.
	9. 3. Set up the tacked joint in specific position.
	9. 4. Deposit the weld following proper welding technique and safety aspect.
	9. 5. Carry out visual inspection to ascertain quality weld joint.
10. Set the SMAW machine and perform different type of joints on MS in different position observing standard procedure. <i>[different types of joints- Fillet (T-joint, lap & Corner), Butt (Square & V); different position - 1F, 2F, 3F,4F, 1G, 2G, 3G, 4G]</i>	10.1 Plan and select the type & size of electrode, welding current.
	10.2 Prepare edge as per requirement
	10.3 Prepare, set SMAW machine and tack the pieces as per drawing.
	10.4 Set up the tacked pieces in specific position.
	10.5 Deposit the weld maintaining appropriate arc length, electrode angle, welding speed, weaving technique and safety aspects.
	10.6 Clean the welded joint thoroughly.
	10.7 Carry out visual inspection for appropriate weld joint & check by gauges.
11. Set the oxy- acetylene cutting plant and perform different cutting operations on MS plate. <i>[Different cutting operation –</i>	11. 1. Plan and mark on MS plate surface for straight/bevel/circular cutting.
	11. 2. Select the nozzle size and working pressure of gases as per requirement.
	11. 3. Set the marked plate properly on cutting table.
	11. 4. Set the cutting plant & perform the cutting operation

<i>Straight, Bevel, circular]</i>	maintaining proper techniques and all safety aspects.
	11. 5. Clean the cutting burrs and inspect the cut surface for soundness of cutting.
12. Perform welding in different types of MS pipe joints by Gas welding (OAW). <i>[Different types of MS pipe joints – Butt, Elbow, T-joint, angle (45°) joint, flange joint]</i>	12. 1. Plan and prepare the development for a specific type of pipe joint.
	12. 2. Mark and cut the MS pipe as per development.
	12. 3. Select the size of filler rod, size of nozzle, working pressure etc.
	12. 4. Set and tack the pieces as per drawing.
	12. 5. Deposit the weld bead maintaining proper technique and safety aspects.
	12. 6. Inspect the welded joint visually for poor penetration, uniformity of bead and surface defects.
13. Set the SMAW machine and perform welding in different types of MS pipe joints by SMAW. <i>[Different types of MS pipe joints – Butt, Elbow, T-joint, angle (45°) joint, flange joint]</i>	13. 1. Plan and prepare the development for a specific type of pipe joint.
	13. 2. Mark and cut the MS pipe as per development.
	13. 3. Select the electrode size and welding current for welding.
	13. 4. Set and tack the pieces as per drawing.
	13. 5. Deposit the weld bead maintaining proper technique and safety aspects.
	13. 6. Insect the welded joint visually for root penetration, uniformity of bead and surface defects.
14. Choose appropriate welding process and perform joining of different types of metals and check its correctness. <i>[appropriate welding process – OAW, SMAW; Different metal – SS, CI, Brass, Aluminium]</i>	14. 1. Plan and prepare the pieces for welding.
	14. 2. Select the type and size of filler rod and flux/electrode, size of nozzle and gas pressure/welding current, preheating method and temperature as per requirement.
	14. 3. Set and tack metals as per drawing.
	14. 4. Deposit the weld maintaining appropriate technique and safety aspects.
	14. 5. Cool the welded joint by observing appropriate cooling method. Use post heating, peening etc. as per requirement.
	14. 6. Clean the joint and inspect the weld for its uniformity and different types of surface defects.
15. Demonstrate arc gauging operation to rectify the weld joints.	15. 1. Plan and select the size of electrode for Arc gouging.
	15. 2. Select the polarity and current as per requirement.
	15. 3. Perform gouging adapting proper gouging technique.
	15. 4. Clean and check to ascertain the required stock removed.

Semester-II

LEARNING/ ASSESSABLE OUTCOMES	ASSESSMENT CRITERIA
16. Test welded joints by different methods of testing. <i>[different methods of testing- Dye penetration test, Magnetic particle test, Nick break test, Free band test, Fillet fracture test]</i>	16. 1. Plan and select the job and clean the surface thoroughly.
	16. 2. Select the appropriate testing methods.
	16. 3. Perform testing of welded joints adapting standard operating procedure.
	16. 4. Record the test result & compare with standard parameter/ result value.
	16. 5. Accept/reject the job based on test result.
17. Set GMAW machine and perform welding in different types of joints on MS sheet/plate by GMAW in various positions by dip mode of metal transfer. <i>[different types of joints- Fillet (T-joint, lap, Corner), Butt (Square & V); various positions- 1F, 2F, 3F,4F, 1G, 2G, 3G]</i>	17.1 Select size of electrode wire, welding voltage, gas flow rate, wire feed rate as per requirement.
	17.2 Prepare, set (machine & Job) and tack the pieces as per drawing and type of joints.
	17.3 Set up the tacked joint in specific position.
	17.4 Deposit the weld adapting proper welding technique and safety aspects.
	17.5 Carry out visual inspection to ensure quality of welded joint.
	17.6 Inspect the weld using Dye-penetration Test (DPT)/Magnetic particle Test (MPT).
18. Set the GTAW machine and perform welding by GTAW in different types of joints on different metals in different position and check correctness of the weld. <i>[different types of joints- Fillet (T-joint, lap, Corner), Butt (Square & V) ; different metals- Aluminium, Stainless Steel; different position- 1F & 1G]</i>	18. 1. Select power source as per material, size and type of Tungsten electrode, welding current, gas nozzle size, gas flow rate and filler rod size as per requirement.
	18. 2. Prepare, set (machine & Job) and tack the pieces as per drawing and type of joints.
	18. 3. Set up the tacked joint in specific position.
	18. 4. Deposit the weld by adapting proper welding technique and safety aspects.
	18. 5. Carry out visual inspection to ensure quality of welded joint.
	18. 6. Inspect the weld using Dye-penetration Test (DPT)/Magnetic particle Test (MPT).
19. Perform Aluminium & MS pipe joint by GTAW in flat position.	19. 1. Plan and prepare development or edge preparation for specific type of pipe joint.
	19. 2. Mark and cut the MS pipe as per development.
	19. 3. Select the type of welding current, size and type of tungsten electrode, size of nozzle, gas flow rate and welding current as per requirement.
	19. 4. Set and tack the piece as per drawing.
	19. 5. Deposit the weld bead maintaining proper technique and

	<p>safety aspects.</p> <p>19. 6. Inspect the welded joint visually for root penetration, bead uniformity and surface defects.</p>
20. Set the Plasma Arc cutting machine and cut ferrous & non-ferrous metals.	<p>20. 1. Plan and mark on Ferrous/Non ferrous metal plates surface for plasma cutting.</p> <p>20. 2. Select the torch/nozzle size, current and working pressure of gas as per requirement.</p> <p>20. 3. Set the marked plate properly on cutting table.</p> <p>20. 4. Set the plasma cutting machine and perform the cutting operation by adapting proper techniques and safety aspects.</p> <p>20. 5. Clean and inspect the cut surface for quality of cutting.</p>
21. Set the resistance spot welding machine and join MS & SS sheet.	<p>21. 1. Plan and select the material and clean the surface thoroughly.</p> <p>21. 2. Set the spot welding parameters on machine.</p> <p>21. 3. Spot weld the joint adapting appropriate techniques and safety.</p> <p>21. 4. Inspect the joint for soundness of weld.</p>
22. Perform joining of different similar and dissimilar metals by brazing operation as per standard procedure. <i>[different similar and dissimilar metals- Copper, MS, SS]</i>	<p>22. 1. Plan and select the nozzle size, working pressure type of flame, filler rod and flux as per requirement.</p> <p>22. 2. Prepare, set and tack the pieces as per drawing.</p> <p>22. 3. Braze the joint adapting proper brazing technique and safety aspect.</p> <p>22. 4. Carry out visual inspection to ascertain quality weld joint.</p>
23. Repair Cast Iron machine parts by selecting appropriate welding process. <i>[Appropriate welding process- OAW, SMAW]</i>	<p>23. 1. Plan and prepare the job as per requirement.</p> <p>23. 2. Select the type & size of electrode, power source, polarity, welding current as per requirement</p> <p>23. 3. Set the part properly.</p> <p>23. 4. Deposit the weld adapting appropriate welding technique and safety aspects.</p> <p>23. 5. Clean the welded joint thoroughly.</p> <p>23. 6. Carry out visual inspection to ascertain quality of weld joint.</p>
24. Hard facing of alloy steel components / MS rod by using hard facing electrode.	<p>24. 1. Plan and prepare the component by cleaning the surface thoroughly.</p> <p>24. 2. Select the type & size of electrode, power source, welding current as per requirement.</p> <p>24. 3. Deposit the weld observing standard practice and safety.</p> <p>24. 4. Clean the welded surface thoroughly</p>

	24. 5. Carryout visual inspection to ascertain quality of weld.
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Means of assessment 1

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Means of assessment 2**Pass/Fail**

The minimum pass percentage is 40% for each Theory Examination and 25% for each part/section of the Examination separately, and 60% marks for each Trade practical Examination.

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SECTION 2

EVIDENCE OF LEVEL

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OPTION A

Title/Name of qualification/component: Welder		Level: 4	
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
Process	<p>Familiar, Predictable, Routine Situations of Clear Choice</p> <ul style="list-style-type: none"> • Set the oxy- acetylene cutting plant and perform different cutting operations on MS plate. [Different cutting operation – Straight, Bevel, circular] • Perform welding in different types of MS pipe joints by Gas welding (OAW). [Different types of MS pipe joints – Butt, Elbow, T-joint, angle (45°) joint, flange joint] • Choose appropriate welding process and perform joining of different types of metals and check its correctness. [appropriate welding process – OAW, SMAW; Different metal – SS, CI, Brass, Aluminium] • Test welded joints by different methods of testing. [different methods of testing- Dye penetration test, Magnetic particle test, Nick break test, Free band test, Fillet fracture test] • Set GMAW machine and perform welding in different types of joints on MS sheet/plate by GMAW in various positions by dip mode of metal transfer. [different types of joints- Fillet (T-joint, lap, Corner), Butt (Square & V); various positions- 1F, 2F, 3F,4F, 1G, 2G, 3G] • Set the GTAW machine and perform welding by GTAW in different types of joints on different metals in different position and check correctness of the weld. [different types of joints- Fillet (T-joint, lap, Corner), Butt (Square & V) ; different metals- Aluminium, Stainless Steel; different position- 1F & 1G] • Repair Cast Iron machine parts by selecting appropriate welding process. [Appropriate welding process- OAW, SMAW] 	<p>In all the learning outcomes for example ‘Perform welding in different types of MS pipe joints by Gas welding’ and ‘Test welded joints by different methods of testing’ the learner will be required to choose appropriate process, setting, tools, materials as per the requirement of the job.</p> <p>The work will however be done within a familiar, predictable and routine range of situations as mentioned in the assessment criteria.</p> <p>Thus the learner requires to demonstrate ability to work in familiar, predictable, routine, situation of clear choice.</p> <p>And the NSQF level as per this descriptor will be 4.</p>	4

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Welder

Title/Name of qualification/component: Welder		Level: 4	
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
Professional knowledge	<p>Knowledge of facts in a field of work or study</p> <ul style="list-style-type: none"> • Safety precautions in Shielded Metal Arc Welding, and Oxy-Acetylene Welding and Cutting.. • Arc and Gas Welding Equipments, tools and accessories. • Various Welding Processes and its applications. • Arc and Gas Welding terms and definitions. • Different process of metal joining methods • Types of welding joints and its applications • Basic electricity applicable to arc welding and related electrical terms & definitions. • Heat and temperature and its terms related to welding • Principle of arc welding. And characteristics of arc . • Chemistry of oxy-acetylene flame. • Types of oxy-acetylene flames and uses. • Oxy-Acetylene Cutting Equipment principle, parameters and application. • Arc welding power sources: Transformer, Motor Generator set, Rectifier and Inverter type welding machines and its care & maintenance.. • Advantages and disadvantages of A.C. and D.C. welding machines • Welding positions as per EN & ASME : flat, horizontal, vertical and over head position. Weld slope and rotation. Welding symbols as per BIS & AWS. • Arc length – types – effects of arc length. • Polarity: Types and applications. • Weld quality inspection, common welding mistakes and appearance of good and 	<p>The learner will need to be well versed with Factual knowledge of field of computer hardware, software and various applications as can be seen from the examples presented from various learning outcomes for example 'Different process of metal joining methods', 'Principle of arc welding' and 'Types of welding joints and its applications'.</p> <p>Hence NSQF Level 4 for this descriptor</p>	4

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Welder

Title/Name of qualification/component: Welder		Level: 4	
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	<p>defective welds</p> <ul style="list-style-type: none"> • Weld gauges & its uses • Calcium carbide properties and uses. • Acetylene gas properties and generating methods. • Acetylene gas Purifier, Hydraulic back pressure valve and Flash back arrestor 		
Professional skill	<p>Recall and demonstrate practical skill, routine and repetitive in narrow range of application using appropriate rule and tool</p> <ul style="list-style-type: none"> • Set the gas welding plant and join MS sheet in different position. [Different position: - 1F, 2F, 3F, 1G, 2G, 3G.] <ul style="list-style-type: none"> ○ Plan and select the nozzle size, working pressure, type of flame, filler rod as per requirement. ○ Prepare, set and tack the pieces as per drawing. ○ Set up the tacked joint in specific position. ○ Deposit the weld following proper welding technique and safety aspect. ○ Carry out visual inspection to ascertain quality weld joint. • Set the SMAW machine and perform different type of joints on MS in different position observing standard procedure. [different types of joints- Fillet (T-joint, lap & Corner), Butt (Square & V); different position - 1F, 2F, 3F,4F, 1G, 2G, 3G, 4G] <ul style="list-style-type: none"> ○ Plan and select the type & size of electrode, welding current. ○ Prepare edge as per requirement ○ Prepare, set SMAW machine and tack the pieces as per drawing. ○ Set up the tacked pieces in specific position. ○ Deposit the weld maintaining appropriate arc length, electrode angle, welding speed, weaving technique and safety aspects. ○ Clean the welded joint thoroughly. 	<p>The learner will be able to work independently and recall and demonstrate practical skill, routine and repetitive in narrow range of application, using appropriate rule and tool as per the job given to them. This can be ascertained from the Assessment Criteria.</p>	4

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Welder

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NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	<ul style="list-style-type: none"> ○ Carry out visual inspection for appropriate weld joint & check by gauges. ● 11. Set the oxy- acetylene cutting plant and perform different cutting operations on MS plate. [Different cutting operation – Straight, Bevel, circular] Plan and mark on MS plate surface for straight/bevel/circular cutting. <ul style="list-style-type: none"> ○ Select the nozzle size and working pressure of gases as per requirement. ○ Set the marked plate properly on cutting table. ○ Set the cutting plant & perform the cutting operation maintaining proper techniques and all safety aspects. ○ Clean the cutting burrs and inspect the cut surface for soundness of cutting. ● 12. Perform welding in different types of MS pipe joints by Gas welding (OAW). [Different types of MS pipe joints – Butt, Elbow, T-joint, angle (45°) joint, flange joint] <ul style="list-style-type: none"> ○ Plan and prepare the development for a specific type of pipe joint. ○ Mark and cut the MS pipe as per development. ○ Select the size of filler rod, size of nozzle, working pressure etc. ○ Set and tack the pieces as per drawing. ○ Deposit the weld bead maintaining proper technique and safety aspects. ○ Inspect the welded joint visually for poor penetration, uniformity of bead and surface defects. ● 13. Set the SMAW machine and perform welding in different types of MS pipe joints by SMAW. [Different types of MS pipe joints – Butt, Elbow, T-joint, angle (45°) joint, flange joint] <ul style="list-style-type: none"> ○ Plan and prepare the development for a specific type of pipe joint. ○ Mark and cut the MS pipe as per development. ○ Select the electrode size and welding current for welding. ○ Set and tack the pieces as per drawing. 		

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NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	<ul style="list-style-type: none"> ○ Deposit the weld bead maintaining proper technique and safety aspects. ○ Inspect the welded joint visually for root penetration, uniformity of bead and surface defects. ● 14. Choose appropriate welding process and perform joining of different types of metals and check its correctness. [appropriate welding process – OAW, SMAW; Different metal – SS, CI, Brass, Aluminium] <ul style="list-style-type: none"> ○ Plan and prepare the pieces for welding. ○ Select the type and size of filler rod and flux/electrode, size of nozzle and gas pressure/welding current, preheating method and temperature as per requirement. ○ Set and tack metals as per drawing. ○ Deposit the weld maintaining appropriate technique and safety aspects. ○ Cool the welded joint by observing appropriate cooling method. Use post heating, peening etc. as per requirement. ○ Clean the joint and inspect the weld for its uniformity and different types of surface defects. ● 15. Demonstrate arc gouging operation to rectify the weld joints. <ul style="list-style-type: none"> ○ Plan and select the size of electrode for Arc gouging. ○ Select the polarity and current as per requirement. ○ Perform gouging adapting proper gouging technique. ○ Clean and check to ascertain the required stock removed. <p>Using quality concepts</p> <ul style="list-style-type: none"> ● Understand and explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality. 	<p>The learner will also be responsible for own quality of work and will have to use quality tools to check own work to ensure conformance to requirements of the job.</p>	

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Welder

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NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	<ul style="list-style-type: none"> Carry out visual inspection for appropriate weld joint & check by gauges. Deposit the weld bead maintaining proper technique and safety aspects. Inspect the welded joint visually for poor penetration, uniformity of bead and surface defects. Clean the cutting burrs and inspect the cut surface for soundness of cutting Clean the joint and Inspect the weld for its uniformity and different types of surface defects. 	Hence NSQF Level is 4 for this descriptor	
Core skill	<p>Language to communicate written or oral, with required clarity</p> <ul style="list-style-type: none"> Obtain sources of information and recognize information. Use and draw up technical drawings and documents. Use documents and technical regulations and occupationally related provisions. Conduct appropriate and target oriented discussions with higher authority and within the team. Present facts and circumstances, possible solutions & use English special terminology. Resolve disputes within the team Conduct written communication. <p>Skill to basic arithmetic and algebraic principles</p> <ul style="list-style-type: none"> Understand and explain different mathematical calculation & science in the field of study including basic electrical. [Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & 	<p>The learner will also need to communicate with team supervisor to understand the job and explain ones work which requires competence in oral language, with required clarity.</p> <p>The learner will have to be skilled in basic arithmetic and algebraic principles in order to work with formulas and accounts related work</p>	4

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NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	<p>Temperature, elasticity]</p> <ul style="list-style-type: none"> Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work. <p>Basic understanding of social political and natural environment</p> <ul style="list-style-type: none"> Comply environment regulation and housekeeping. <ul style="list-style-type: none"> Identify environmental pollution & contribute to the avoidance of instances of environmental pollution. Deploy environmental protection legislation & regulations Take opportunities to use energy and materials in an environmentally friendly manner Avoid waste and dispose waste as per procedure Recognize different components of 5S and apply the same in the working environment. 	<p>The learner will also need to have basic understanding of social political and natural environment as per the learning outcome for example ‘Comply to environment regulation and housekeeping ‘</p> <p>Hence NSQF Level 4 for this descriptor</p>	
Responsibility	<ul style="list-style-type: none"> Set the gas welding plant and join MS sheet in different position. Set the SMAW machine and perform different type of joints on MS in different position observing standard procedure. Set the oxy- acetylene cutting plant and perform different cutting operations on MS plate. Perform welding in different types of MS pipe joints by Gas welding (OAW). Set the SMAW machine and perform welding in different types of MS pipe joints by SMAW. Choose appropriate welding process and perform joining of different types of metals and check its correctness. Demonstrate arc gauging operation to rectify the weld joints. 	<p>The welder has to perform all the learning outcomes independently and as per requirements and standard operating procedure, while achieving the quality standards, hence is responsible for own work and learning.</p> <p>Hence NSQF Level is 4 for this</p>	4

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NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF level descriptors	NSQF Level
	<ul style="list-style-type: none">• Test welded joints by different methods of testing.• Set GMAW machine and perform welding in different types of joints on MS sheet/plate by GMAW in various positions by dip mode of metal transfer.• Set the GTAW machine and perform welding by GTAW in different types of joints on different metals in different position and check correctness of the weld.• Perform Aluminium & MS pipe joint by GTAW in flat position.• Set the Plasma Arc cutting machine and cut ferrous & non-ferrous metals.• Set the resistance spot welding machine and join MS & SS sheet.• Perform joining of different similar and dissimilar metals by brazing operation as per standard procedure.• Repair Cast Iron machine parts by selecting appropriate welding process.• Hard facing of alloy steel components / MS rod by using hard facing electrode.	descriptor	

SECTION 3**EVIDENCE OF NEED****What evidence is there that the qualification is needed?**

The trade forms a part of the Recruitment Rules of major Employers like BHEL, SAIL, Ordnance Factories, Indian Railways etc.

Placement records from few ITIs are enclosed.

What is the estimated uptake of this qualification and what is the basis of this estimate?

The employment prospect for this qualification is very high. There is also high demand for starting the training programme on this trade amongst new institutes. As of now the total seating capacity of the training programme is 1,00,149 (including 30% supernumeraries) approximately in 2,117 ITIs.

What steps were taken to ensure that the qualification(s) does (do) not duplicate already existing or planned qualifications in the NSQF?

The qualification is originally designed and approved by NCVT for the Craftsmen Training Scheme and is in existence for the last 60 years. NCVT has been entrusted with the responsibilities of prescribing standards and curricula for craftsmen training, advising the Government of India on the overall policy and programmes, conducting All India Trade Tests and awarding National Trade Certificates.

The qualifications of other bodies are of small duration, are specific and cater to specific job roles whereas this qualification prepares the trainee for multiple job roles like MIG-MAG/GMAW Welder, Tungsten Inert Gas Welder (GTAW) and Resistance Spot Welding Machine Operator etc.

What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated?

- Mentor Council (MC) for the Fabrication sector was formed in 2014 to review the curriculum of this qualification under the sector.
- CSTARI, the research wing of DGT, reviews and updates the qualification, in consultation with industries and other stakeholders, on a regular basis by conducting trade committee meetings.
- DGT will keep on doing continuous comparative study in the trade by referring to relevant upcoming qualifications in the National Qualifications Register (NQR) and relevant sectors.

Please attach any documents giving further information about any of the topics above.

Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

SECTION 4

EVIDENCE OF PROGRESSION

What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?

Qualifying trainee will obtain an NCVT Certificate in Fitter trade which gives the following options of progression to the trainee:

- i) National Apprenticeship Certificate or
- ii) National Craft Instructor Certificate or
- iii) Can join as semi-skilled worker in the industry and can become supervisor after doing part-time diploma in relevant branch of Engineering

Please attach any documents giving further information about any of the topics above.

Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.